

Predictors of Earnings Risk with Machine Learning

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Abstract

This paper looks at the determinants of lifetime earnings risk under a Restricted Income Profile (RIP) model using traditional and machine learning methods such as lasso and SHAP values. The paper builds on the work of Drewianka and Oberg (2025) which uses a moment condition approach derive a parameter that captures permanent income risk. The paper finds that education and age are important in explaining lifetime earnings risk. The paper also finds that macroeconomic variables such as probability of recession and real GDP growth are important and along with state controls may further imply a role of government policy. Finally, the paper finds that occupation controls are important while industry controls do not appear to play a strong role.

Keywords: machine learning, restricted income profile, earnings instability, risk

JEL Codes: D8, J0, D3

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Table 1: Your Table Title Here

	(1)	(2)	(3)	(4)	(5)
	Gamma	Gamma	Gamma	Gamma	Gamma
Less than High School	-0.00950* (0.00407)	-0.00719 (0.00437)	-0.00542 (0.00485)	-0.00196 (0.00523)	-0.00479 (0.00519)
High School Graduate	-0.00632* (0.00259)	-0.00591* (0.00269)	-0.00506 (0.00294)	-0.00287 (0.00334)	-0.00399 (0.00331)
Some College	-0.00278 (0.00296)	-0.00277 (0.00304)	-0.00186 (0.00323)	-0.000549 (0.00350)	-0.000961 (0.00345)
Probability of Recession	0.0000411 (0.0000842)	-0.00207 (247.5)	-0.0962 (0.0528)	-0.000140 (297.1)	-0.0953 (0.0550)
Real GDP growth rate	0.000553 (0.000719)	-0.0130 (19.13)	-0.0137 (0.00703)	-0.00832 (22.96)	-0.0161* (0.00722)
5-year moving average of AEP	0.0000266 (0.0000548)	0.000000171 (0.0000595)	-0.00000250 (0.0000654)	0.0000340 (0.0000693)	0.0000309 (0.0000700)
veteran	-0.00281 (0.00436)	-0.00341 (0.00447)	-0.00610 (0.00649)	-0.00755 (0.00686)	-0.00828 (0.00677)
Out of Labor Force	-0.0101 (0.00848)	-0.00862 (0.00853)	-0.0227 (0.0142)	-0.0216 (0.0146)	-0.0220 (0.0144)
Tenure	0.0000614 (0.000151)	0.000140 (0.000162)	0.000202 (0.000164)	0.000151 (0.000171)	0.000184 (0.000168)
Age	0.00592 (0.00491)	0.00559 (0.00504)	0.00559 (0.00558)	0.00884 (0.00581)	0.00733 (0.00567)
Age Squared	-0.000160 (0.000116)	-0.000169 (0.000119)	-0.000172 (0.000130)	-0.000252 (0.000135)	-0.000213 (0.000132)
Age Cubed	0.00000140 (0.000000886)	0.00000150 (0.000000906)	0.00000155 (0.000000984)	0.00000219* (0.00000102)	0.00000185 (0.00000100)
State FE	No	Yes	Yes	Yes	Yes
Year FE	No	Yes	Yes	Yes	Yes
Race FE	No	Yes	Yes	Yes	Yes
Cohort FE	No	Yes	Yes	Yes	Yes
Occupation FE	No	No	No	Yes	Yes
Industry FE	No	No	Yes	No	Yes
R-squared	0.001	0.004	0.009	0.010	0.013
N	25920	25913	20954	20823	20746

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 2: Your Table Title Here

	(1) Gamma	(2) Gamma	(3) Gamma	(4) Gamma	(5) Gamma
Less than High School	-0.00768* (0.00363)	-0.00769* (0.00364)			
High School Graduate	-0.00489* (0.00212)	-0.00494* (0.00212)			
Age Cubed	0.000000364* (0.000000145)	0.000000367* (0.000000145)	0.000000449** (0.000000157)	0.000000558*** (0.000000162)	0.000000476** (0.000000158)
Age Squared	-0.0000222* (0.00000985)	-0.0000225* (0.00000985)	-0.0000287** (0.0000108)	-0.0000352** (0.0000111)	-0.0000304** (0.0000109)
twoind==Agric.,Forestry			0.00842 (0.00809)		0.00823 (0.00811)
twoind==Fisheries			0.0586 (0.0390)		0.0585 (0.0391)
twoind==Energy/Water			-0.00287 (0.00645)		-0.00282 (0.00649)
twoind==Mining			0.0229 (0.0120)		0.0251* (0.0121)
twoind==Chemicals			-0.00639 (0.00835)		-0.00653 (0.00836)
twoind==Synthetics			0.00519 (0.0103)		0.00511 (0.0104)
twoind==Earth/Clay/Stone			-0.00334 (0.0125)		0.000439 (0.0127)
twoind==Iron/Steel			0.00161 (0.00701)		0.00127 (0.00706)
twoind==Mechanical Eng			-0.00333 (0.00478)		-0.00352 (0.00480)
twoind==Electrical Eng			0.00223 (0.00617)		0.00250 (0.00626)
twoind==Wood/Paper/Print			0.00387 (0.00593)		0.00391 (0.00595)
twoind==Clothing/Text			-0.00593 (0.00839)		-0.00607 (0.00841)
twoind==Food Industry			0.00551 (0.00830)		0.00314 (0.00833)
twoind==Construction			0.0233** (0.00847)		0.0232** (0.00849)
twoind==Constr. Relate			0.0102* (0.00493)		0.0105* (0.00497)
twoind==Wholesale			-0.00739 (0.00579)		-0.00658 (0.00583)
twoind==Retail			0.0106* (0.00465)		0.0105* (0.00469)
twoind==Train System			-0.00177		-0.00188

Table 3: Your Table Title Here

	(1) Alpha	(2) Alpha	(3) Alpha	(4) Alpha	(5) Alpha
Less than High School	-0.0442*** (0.00889)	-0.0342*** (0.00954)	-0.0299** (0.0108)	-0.0285* (0.0114)	-0.0271* (0.0115)
High School Graduate	-0.0387*** (0.00580)	-0.0364*** (0.00600)	-0.0341*** (0.00664)	-0.0301*** (0.00736)	-0.0277*** (0.00743)
Some College	-0.0234*** (0.00666)	-0.0242*** (0.00681)	-0.0184* (0.00732)	-0.0162* (0.00774)	-0.0146 (0.00778)
Probability of Recession	-0.0000102 (0.000185)	-0.0449 (0.167)	0.00151 (664.2)	0.255 (0.216)	0.245 (0.216)
Real GDP growth rate	-0.00108 (0.00158)	-0.00306 (0.0135)	0.0169 (5.775)	0.0130 (0.0175)	0.0126 (0.0176)
5-year moving average of AEP	0.00142*** (0.000119)	0.00153*** (0.000129)	0.00129*** (0.000144)	0.00148*** (0.000149)	0.00144*** (0.000154)
veteran	-0.0124 (0.00920)	-0.0122 (0.00941)	-0.00408 (0.0146)	-0.000294 (0.0150)	-0.00321 (0.0152)
Out of Labor Force	0.122*** (0.0165)	0.123*** (0.0165)	0.0984*** (0.0289)	0.0891** (0.0291)	0.0923** (0.0291)
Tenure	-0.000825* (0.000330)	-0.0000632 (0.000355)	-0.00000483 (0.000365)	-0.000294 (0.000373)	-0.000244 (0.000372)
Age	0.0158 (0.00985)	0.0186 (0.0101)	0.00916 (0.0115)	0.0162 (0.0116)	0.0113 (0.0116)
Age Squared	-0.000433 (0.000229)	-0.000533* (0.000233)	-0.000283 (0.000263)	-0.000446 (0.000266)	-0.000321 (0.000266)
Age Cubed	0.00000394* (0.00000171)	0.00000477** (0.00000175)	0.00000278 (0.00000195)	0.00000403* (0.00000198)	0.00000299 (0.00000197)
State FE	No	Yes	Yes	Yes	Yes
Year FE	No	Yes	Yes	Yes	Yes
Race FE	No	Yes	Yes	Yes	Yes
Cohort FE	No	Yes	Yes	Yes	Yes
Occupation FE	No	No	No	Yes	Yes
Industry FE	No	No	Yes	No	Yes
R-squared	0.013	0.019	0.029	0.034	0.037
N	32567	32556	25592	25426	25329

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4: Your Table Title Here

	(1) Alpha	(2) Alpha	(3) Alpha	(4) Alpha	(5) Alpha
Less than High School	-0.0456*** (0.00877)	-0.0350*** (0.00947)	-0.0308** (0.0107)	-0.0296** (0.0113)	
High School Graduate	-0.0395*** (0.00578)	-0.0374*** (0.00596)	-0.0346*** (0.00657)	-0.0305*** (0.00729)	-0.0156** (0.00538)
Some College	-0.0237*** (0.00665)	-0.0255*** (0.00677)	-0.0185* (0.00725)	-0.0158* (0.00769)	
Age Cubed	0.00000131*** (0.000000303)	0.00000176*** (0.000000329)	0.00000119*** (0.000000338)	0.00000129*** (0.000000344)	0.00000112** (0.000000343)
Age Squared	-0.0000734*** (0.0000212)	-0.000119*** (0.0000248)	-0.0000686** (0.0000239)	-0.0000752** (0.0000243)	-0.0000653** (0.0000242)
5-year moving average of AEP	0.00146*** (0.000115)	0.00152*** (0.000121)	0.00127*** (0.000139)	0.00149*** (0.000144)	0.00137*** (0.000146)
Tenure	-0.000824* (0.000329)				
Out of Labor Force	0.124*** (0.0164)	0.126*** (0.0164)	0.101*** (0.0287)	0.0942** (0.0289)	0.0973*** (0.0289)
cohort==born pre-1944		0.0464** (0.0168)			
cohort==born 1944-1952		0.0333** (0.0114)			
cohort==born 1953-1960		0.0153 (0.0102)			
state==Unknown State		-0.0612 (0.0635)	-0.0506 (0.0633)	-0.0369 (0.0638)	-0.0393 (0.0634)
state==Alabama		-0.0724 (0.0596)	-0.0576 (0.0605)	-0.0579 (0.0612)	-0.0543 (0.0609)
state==Arizona		0.0136 (0.0587)	0.00742 (0.0597)	0.0275 (0.0603)	0.0256 (0.0600)
state==Arkansas		-0.0700 (0.0575)	-0.0831 (0.0581)	-0.0746 (0.0588)	-0.0750 (0.0584)
state==California		-0.0429 (0.0560)	-0.0376 (0.0566)	-0.0169 (0.0573)	-0.0214 (0.0569)
state==Colorado		0.00951 (0.0591)	-0.0129 (0.0602)	0.00624 (0.0607)	-0.00901 (0.0603)
state==Connecticut		-0.107 (0.0599)	-0.0996 (0.0603)	-0.0753 (0.0615)	-0.0777 (0.0612)
state==Delaware		-0.0715 (0.102)	-0.0374 (0.113)	-0.0170 (0.111)	-0.0297 (0.113)
state==District of Columbia		-0.0598 (0.0620)	-0.0839 (0.0680)	-0.0621 (0.0679)	-0.0571 (0.0686)
state==Florida		-0.0479 (0.0568)	-0.0481 (0.0574)	-0.0306 (0.0580)	-0.0350 (0.0577)
state==Georgia		-0.0972	-0.0853	-0.0590	-0.0654